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1911

U. S. Department of Agriculture

THE AGRICULTURAL STUDENT

A MONTHLY MAGAZINE DEVOTED TO AGRICULTURAL EDUCATION

OHIO NUMBER



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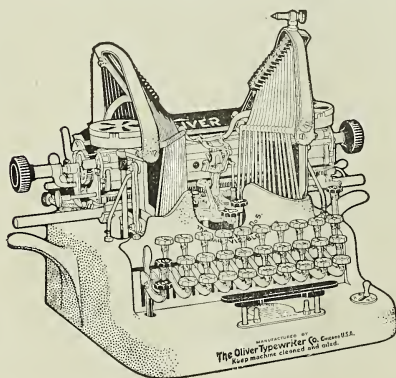
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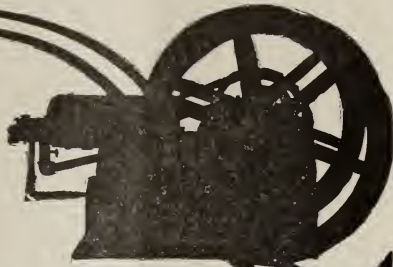
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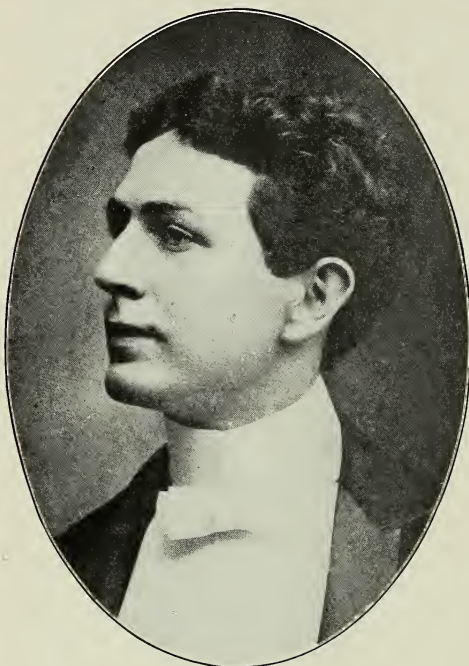


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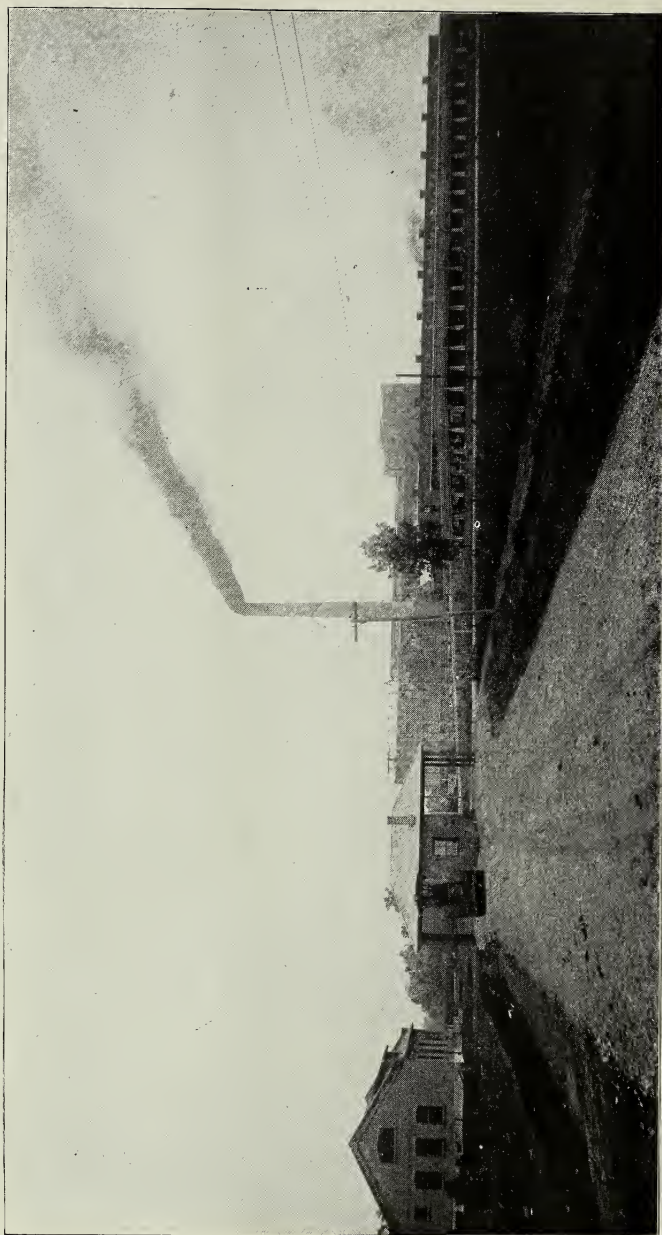
THE AGRICULTURAL STUDENT

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WHERE SUGAR IS MADE IN OHIO.
General View of the Large New Beet Sugar Factory at Paulding, Ohio.

THE AGRICULTURAL STUDENT

Vol. XVII. OHIO STATE UNIVERSITY, COLUMBUS, JANUARY, 1911 Number 5

The Possibilities of Agriculture in Ohio

By Chas. E. Thorne, Director of Ohio Exp. Station

The tide of migration, which has set steadily westward since the first settlement of the white man in America, has reached its culmination. The great bodies of fertile land bordering the western fringe of settlement and calling for occupation has disappeared. Even the arid lands, once looked upon as irreclaimable desert wastes, are being watered and converted into orchards and grain fields, and the lands which a few years ago were being practically given away are now held at prices higher than those which prevail in many of the older settlements. The consequence is that the possibilities of agriculture in these older settlements are being considered more carefully than ever before, and it is some of these possibilities in our own state to which I wish to call attention.

Ohio lies in the gateway between the East and the West. Crossed by five great railway systems having direct transcontinental connections; so netted with branch lines that there are but very few quarter sections in the state that are not within ten miles of a railway, while the distance of the average farm from a railway station possibly does not exceed four miles; with the "Beautiful River" as its southern boundary and the Erie link in the chain of great lakes as its northern, this state offers facilities for transportation not

excelled by any similar area in the world. When we add to this the fact that more than half its people live in large towns and cities scattered over the state, and are largely occupied in manufacturing industries, it will be seen that Ohio offers opportunities for the profitable marketing of farm products that are not excelled in America, and very seldom equaled.

In addition to these advantages Ohio possesses a soil and climate admirably adapted to the production of the two most valuable of cereal grains, corn and wheat. When the white men first set foot on Ohio soil he found the cornfields of the Indian, and corn still remains the greatest crop in the state in area and in potential food production, occupying 3,000,000 acres of land and producing 110,000,000 bushels annually; wheat occupies a little over 2,000,000 acres, and yields 30,000,000 bushels annually; oats covers a million and a quarter acres and averages an annual yield of 40,000,000 bushels, and hay crops cover 2,744,000 acres, producing 3,000,000 tons.

While, however, these total yields are large, when we come to compute the yield per acre we find that it amounts to but 36 bushels of corn, 14 1-3 of wheat, 33 of oats and 1 1-7 ton of hay; rates of yield so low that the average farm of about 85 acres cannot return to

its owner much more than a bare subsistence, while the man whose crop yields are below the average must find it difficult to provide his family with the necessities of life.

To understand the present situation in Ohio a brief review of the history of its agriculture is necessary. When first occupied by the white man the state was practically an unbroken forest. During the first half century of this occupation the chief work of the farmer was clearing the land of timber, and his facilities for transportation were limited to the river and lake on the boundaries of the state and to wagons in the interior, until the two lines of canal were opened near the end of this period. Under these conditions the practice was developed of converting the produce of the farm into meat and driving this meat to market, or into wool, in which large value is condensed into small weight. The keeping of live stock thus became a habit, and while the larger part of the manure was wasted, through either neglect or ignorance of the principles upon which its conservation depends, still enough was saved to add materially to the productiveness of the land, and there was a general increase in the yield per acre and in the prosperity of the farmer, both more yields and land values rising to the maximum for the century during the seventh decade.

At the end of this period came the opening of the West through the construction of the transcontinental railways. The boundless acres of free pasturage in the West and Southwest stimulated meat and wool production to excess, and the great wheat producing area of the Northwest flooded the market with this grain, so that the Ohio farmer found himself facing a steadily

declining market for his three principal products.

Simultaneously with the development of the western ranges and bonanza wheat farms came the erection of grain elevators at practically every railroad station in the state, and the introduction of commercial fertilizers. The farmer, driven to desperation by the low prices of grain, extended his acreage to the utmost, in order to make up for the low price per bushel by a larger number of bushels; the elevator stood ready to pay cash for his grain, and the persuasive fertilizer agent was equally ready to exchange his commodity for the farmer's note, so that there has grown up the habit of neglecting the barnyard and leaning upon the fertilizer sack for fertility maintenance, a habit which could only result in a narrowing margin between cost of production and value of product, even if the full fertilizer value of the needed manure had been restored to the land; but which, under the actual practice followed, of purchasing in fertilizers only a small fraction of the elements required to maintain fertility, has resulted in a continuously low average yield, notwithstanding the annual additions of new and fertile soil to the area under cultivation, by the steady cutting away of the forest.

As an illustration of what has taken place I exhibit a table giving for Wayne county, one of the wealthiest agricultural counties of the state, the average area under cultivation, exclusive of meadows and pastures; the live stock equivalent to cattle, assuming that 10 sheep or swine will equal one cattle beast in manure production; the ratio of cattle to acres under cultivation; the cost of fertilizers and the yield per acre of cereal crops, all by 10-year periods

except the first and last, which are for 9 years each, as computed from the statistics collected by the township assessors of the state

of treating its soil. These experiments have been steadily pursued since their first inauguration, but at the end of ten years the methods which they indicat-

PROGRESS OF AGRICULTURE IN WAYNE COUNTY.

Period.	Area in Crops, Acres.	Cattle Equiva- lent, No.	Cattle to Crop Ratio.	Cost of Ferti- lizer.	Yield per Acre.		
					Wheat, Bu.	Oats, Bu.	Corn, Bu.
1851-59	85,760	49,366	1:1.74	.....	12.6	26.8	25.3
1860-69	84,985	54,913	1:1.55	.....	13.1	32.1	32.0
1870-79	99,669	49,477	1:2.01	.....	16.8	41.2	34.2
1880-89	111,413	46,150	1:2.41	\$20,646	16.9	34.2	36.2
1890-99	115,823	39,360	1:2.94	41,643	16.1	33.6	34.9
1900-08	115,974	36,867	1:3.14	75,682	18.4	38.0	38.7

This table shows that since the war period there has been a steady increase in the area under crops and a steady decrease in the number of live stock, with a constantly widening ratio between live stock and crop acreage. It shows also, that, under the ratio of live stock to crop acreage which prevailed during the first thirty years, there was a large increase in the rate of yield per acre, but that the rate of production, to which this system had brought the land, has only been maintained by constantly increasing purchases of fertilizers, since the live stock has been allowed to drift away.

That the present crop yields in Wayne county are far below an easily possible and thoroughly practicable attainment is shown by the work of the Ohio Agricultural Experiment Station, which is located in that county and on a soil fairly representative of the soils of the county as a whole.

The Station was removed to Wayne county in 1892, and at once instituted a series of systematic experiments, designed to determine the best method

ed were put into operation in the general management of the farm. The result is that on a tract of 40 acres, farmed in a 4-year rotation of corn, oats, wheat and clover, the yield of corn has been increased to a 5-year average of 70 shelled bushels per acre; that of oats to 55 bushels; that of wheat to 36½ bushels, and that of hay to 4 tons.

During this period the average yields of Wayne county have been 38 bushels each of corn and oats, 17½ bushels of wheat and 1 1-3 tons of hay.

Rating corn at half a dollar a bushel, oats at a third of a dollar, wheat at a dollar and hay at eight dollars per ton, and throwing in the straw and stover for good measure, the average annual value per acre of the crops grown in a 4-year rotation of corn, oats, wheat and clover would amount to \$15.60, while that of the crops grown at the Station would reach \$31.00.

To produce these yields the county has expended for fertilizers a little more than half a dollar annually for each acre in the cereal crops, and has

(Continued on Page 34.)

Sugar Beets---Ohio's New Crop

Every day for the past three months a hundred tons of granulated sugar have been made in Ohio. One week from now, when the 1910 "campaign" is over, ten thousand tons of granulated sugar will have been made in Ohio. Formerly sugar came from the South,

in Ohio, and the end of a great deal of promotion and experimentation. It was formerly thought that sugar beets could not be grown in this State. Experiments at Wooster in 1890 seemed to justify such an opinion. Nevertheless, in the late nineties a small factory was



The Raw Material Arriving by Freight. Beets Cannot be Profitably Hauled Farther Than Five or Six Miles in Wagons.

later also from the West, now we produce it at home. On the first day of last October, Governor Harmon turned on the steam which started the wheels of Ohio's first large beet sugar plant. This factory is located in Paulding Co., in the northwestern corner of the State.

The formalities incident to starting this million dollar plant marked at once; the beginning of a new industry

built in Sandusky County at Fremont. The Fremont factory has never been able to secure enough beets to make a good run.

In 1902 a public spirited citizen of Paulding County conceived the idea that, though beets could not be grown successfully in Holmes County, and with only varying success in Sandusky County, they might still be found to

thrive on the rich corn soil of the north-western corner of the State. Accordingly, beets were grown and tested in

the German American Sugar Co. This winter sees it running day and night to handle last season's bumper crop.



One of the Two "Sugar Pans." It Takes Big Machinery to Make Sugar, Especially Where 100 Tons are Made Every Day.

a small way, for a number of years. In 1907 the farmers began to raise small fields of beets, shipping them to Michigan. Finally, in 1909 the erection of a sugar plant at Paulding was begun by

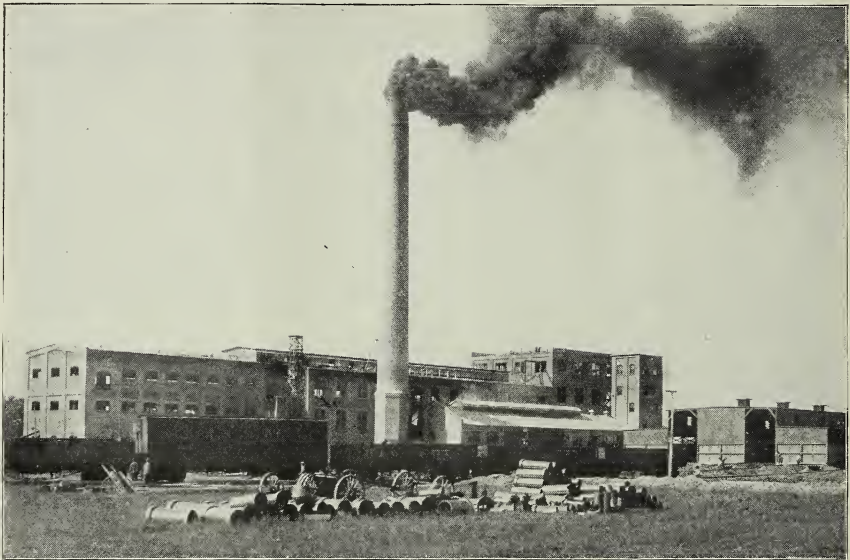
The Paulding factory slices nearly a thousand tons of beets a day. Ten tons of beets make a ton of sugar, so the daily output is a hundred tons of refined granulated sugar. Samples of

the various stages in the process are on view in the Department of Agricultural Chemistry.

In addition to the sugar there are three by-products of considerable value.

of lime are used in the process. The refuse "lime cake" is in a particularly good form for use as a soil amendment and may be had for the hauling.

The raw material for the factory was



The Main Building at Close Quarters.



The sheds in the background, which are each 600 feet long, hold only enough beets to last the factory ten days; so enormous quantities must be piled out on the ground.

One tank car of molasses is shipped out every day. The pulp is ground and dried. The principal use is as a feed for dairy cows, for which purpose it sells at \$18 per ton. Large quantities

harvested from a little more than six thousand acres. Yields ranged from 14 to 22 tons of beets that analyzed from $13\frac{1}{2}$ to 18 per cent. sugar. The farmers

(Continued on Page 19.)

Soils of Ohio

By Wm. Bembower, '11

Among the numerous resources of Ohio the soils should receive due consideration. They constitute the foundation of our agriculture and indeed present a broad subject, covering the entire state. It will therefore be understood why only a few important points may be brought out in this short article.

The study of the soil may be approached from various points of view, namely: as to its origin, its chemical composition, its physical and mechanical make-up, its crop producing capacity, etc.

A large proportion of the soils of Ohio are of glacial origin, having been reworked by the pre-historic glacier, which at one time covered that portion of the state to the north and west of a line passing through the following counties: Columbiana, Stark, Holmes, Coshocton, Licking, Muskingum, Perry, Hocking, Ross, Highland, Adams and Brown.

The underlying rock has some influence on these soils, but a large amount of the material found in them was brought from regions farther north. In general, the western half of the state, with the exception of the northwest corner, is underlaid with limestone. The eastern half and the northwest corner are underlaid by shale, sandstone and occasional strata of limestone and coal.

Bordering the lake in the northern part of the state is a group of soils of locustrian origin. These are thought to have been formed during a period of time when the lake occupied a higher level than it does at present.

That portion of the state to the south and east of the glaciated area is covered with sedimentary soils whose or-

igin was brought about by the disintegration of the bed rock, and are known as soils of the Appalachian Mountain and Plateau Province.

In the southwestern portion of the state a portion of the limestone valleys and uplands soil province is found. These are among our most highly developed and fertile soils.

Scattered throughout the state are areas of cumulose soils which are commonly called muck or peat deposits, which were formed in swamps by the accumulation of plant growth for centuries.

As to the chemical composition of the soil, it is known that certain elements must be present in available condition or the plants will not grow. A chemical analysis is, however, not always satisfactory, as a means of indicating what elements of plant food should be added to the soil. The experimental plot test, as used by the Experiment Station at Wooster, is a much more satisfactory method.

The crop producing capacity of the soil, therefore, is of considerable importance and this, together with the mechanical and physical analysis of the soil, are the most practical lines of study to pursue. In accordance with this idea the Bureau of Soils of the Department of Agriculture has been doing extensive work throughout the United States.

The soils of the United States have been divided into thirteen large soil provinces according to their mode of origin. Four of these are found in Ohio as indicated on the accompanying map. These provinces are again subdivided into soil series, eighty-six in number,

and again into classes or types. Each soil is then named after its series name and type name, as for example, The Miami black loam.

In the course of the work, the Bureau of Soils has made several surveys in each state in the Union, often in regions with some special soil problem, or in the vicinity of Experiment Stations and Agricultural Colleges. The ten areas surveyed in Ohio are as follows: Mont-

Type of Soil.	Aeres.
Clay loam	1,593,320
Silt loam	524,032
Loam	287,728
Gravelly loam	81,214
Clay	71,396
Stony loam	59,200
Sandy loam	50,100
Sand	36,168
Fine sand loam	27,382
Gravel	2,880



Soil Provinces of Ohio.

gomery Co. area, the Columbus area, the Toledo area, the Ashtabula Co. area, the Wooster area, the Coshocton Co. area, the Cleveland area, the Westerville area, the Meigs Co. area and the Auglaize Co. area, the soil survey of which was completed last year. The total area of these surveys is over 2,800,000 acres.

Ten different types of soil of agricultural importance are found in these areas. In the order of their abundance they are as follows:

In addition to these there are certain areas of rock outcrop, marsh or meadow, etc., which are of no agricultural importance.

The reports of these surveys include many things of interest in addition to the description of the soils encountered and a neat soil map of the area.

In one instance, in relating the history of a particular region, it mentions the prices of agricultural products between 1800 and 1820. "Wheat," it is said, "was as low as 25c per bu.; oats,

These reports may be had for a very reasonable consideration and all who are fortunate enough to be located in

That in too many cases attempts are being made to grow crops on soils at a loss, since the soil is not adapted to such crops, etc.

Clay loom is a general purpose soil, giving good results with bluegrass, and



Soil Surveys of Ohio.

Some of the general conclusions arrived at after these extensive surveys, as to crop adaptations to certain soils, are as follows:

One type of soil may produce a maximum yield of a certain crop in one section, while an entirely different type

Silt loam has been found to be well adopted to general farming and in favored localities to fruit and truck.

Gravelly loam gives good results with corn, wheat, truck and fruit.

(Continued on Page 17.)

Ohio's Resources

By E. R. Hurst

It may be of interest to the general reader to know where Ohio stands in relation to the other states in the Union. Ohio's Agricultural College is among the best to be found in this country, although its exact standing in respect to other like institutions may be open to dispute. The first college in America which continued to give real attention to agricultural matters through a series of years was known as Farmers' College, founded in 1833 and located at College Hill, Ohio, just out of Cincinnati. In the production of men, Ohio is the equal of any other state as measured by the number of presidents she has furnished. It has the greatest density of population of any state west of its eastern border. Ohio leads in the production of pottery, of brick and tile,

fire-clay, sandstone and limestone. Three states excel her in coal, coal gas, natural gas, sand, all stone used, and in population. In the output of crude oil, and coal tar, she has fifth place.

When comparing her agricultural products with those of other states, bear in mind the differences in their areas. Indiana is the smallest of the states mentioned, being .9 as large as Ohio. Pennsylvania is slightly larger than Ohio. Counting Ohio as 1.0, the other leading states have the following ratios: New York about 1.2; Wisconsin, Iowa, Illinois, and Missouri, 1.7; Oklahoma, 1.8; Nebraska, Minnesota, and Kansas, 2.0; California, 3.9; and Texas, 6.5.

The following table shows the leading states in the principal crops. It is founded upon the crop report for 1910:

Corn.	Wheat.	Oats.	Potatoes	Rye	Buckwheat	Hay	Tobacco
1. Ill.	Minn.	Iowa	N. York	Pa.	N. Y.	N. Y.	Ky.
2. Iowa	Kansas	Ill.	Mich.	Mich.	Pa.	Pa.	Va.
3. Mo.	S. Dak.	Minn.	Pa.	Wis.	Mich.	OHIO	N. C.
4. Neb.	Ind.	Neb.	Wis.	N. York	Maine	Iowa	OHIO
5. Ind.	N. Dak.	Wis.	Maine	Minn.	W. Va.	Ill.	Tenn.
6. Tex.	Neb.	OHIO	OHIO	N. J.	Va.	Mo.	Pa.
7. Kans.	Ill.	Ind.	Ill.	Ill.	N. J.	Mich.	Wis.
8. OHIO	OHIO	Mich.	Iowa	Neb.	OHIO	Ind.	Ind.
9. Ky.	Pa.	Kansas	Minn.	Cal.	Wis.	Wis.	Conn.
10. Tenn.	Okla.	N. York	N. J.	OHIO	Vt.	Kansas	Md.

and of total clay products. She produces 90 per cent. of the grindstones in this country. She has the largest number of natural gas consumers and the greatest percentage of coal mined by machinery.

But Ohio's prestige does not lie so much in her superiority in any other line, as her comparatively high standing in such a variety of ways. She probably has a greater variety of products than any other state in such quantities. She takes second place in the production of lime and crushed stone, but is forced to third place in the total output of salt.

It will be noticed that Ohio is the only state found in each list of the ten leading states in these products. Ohio alone produces more corn than any country in the world outside of the United States.

On a 10-year average, Ohio has a higher yield than any other state mentioned in the corn-list, but this yield is exceeded in some of the New England states with their intensive methods. Based on the 10-year average we have ninth place in the yield of oats per acre; rye, 15th; and in wheat, 23rd.

In live stock, no section of equal size

this side of the Atlantic has such a large number of improved stock as is found in Green county and vicinity. That we do not sacrifice quality for quantity is shown by the following comparisons: In the production of horses Ohio is in 7th place, while in their value she takes 4th place. Ohio is now famous for being the home of The Harvester, 2:01, the champion trotting stallion of the world. In number and value of milk cows we rank 8th, and in all other cattle 14th. In the number of sheep Ohio stands 5th, but in the value 4th. In value of all wools produced she is 5th. In value of scoured wool output 3rd. Although Ohio is 7th in the production and value of swine, she has the distinction of being the first state to produce and make use of hog-cholera serum, and has the largest and most successful output in the world.

Ohio has the greatest amount and variety of archeological material found in any one state. Much information

concerning the early people in this country is derived from the numerous village sites scattered about the state.

At the present time Ohio does not shine particularly as a horticultural state, but it has great possibilities along that line. Being a great agricultural state, has somewhat retarded horticultural development, but on the other hand large manufacturing interests have had, and will continue to have, the opposite effect, and Ohio will in the near future take a high rank as a horticultural state. Spring Grove cemetery, in Cincinnati, was one of the first large landscape cemeteries in the world.

Ohio has some disadvantages to some people, but so does every other locality. Utopia is yet to be discovered. Ohio has many advantages that we do not appreciate, and if any one is thinking of trying his fortune some place else he would do well to carefully consider the change.

Soils of Ohio

(Continued from page 15.)

The sandy types are especially fitted for early truck where they are not too leechy. They dry out and worm up earlier in the season, inducing growth to begin earlier.

Peaches do well on these types when they are in proximity to some body of water to afford frost protection.

Much of the rougher land of the state should be devoted to fruit, especially apples, and to forest trees.

Muck soils are especially adapted to onion and celery culture.

Many of the special soil and crop relationships are yet to be worked out

and, whenever possible, individuals should experiment along these lines.

Crop rotations, of course, are necessary, but if it is known which crop is best adapted to one's local conditions, a specialty of that may be made, and a good profit may be realized by bending one's effort in selection and improvement of varieties of such a special crop.

In conclusion then, after this brief survey of the variety of soils in the state, it can be readily seen why Ohio ranks well to the front in so many diversified branches of agriculture.

The Duty of the Man to the Land

By Joseph E. Wing

"I cannot get much interested in problems of soil—they seem so prosaic, so materialistic; now, when it comes to education and problems of human life and living, then I am intensely interested." Thus spoke a friend.

"What, you call the problems of the soil materialistic, grass? Why, man, you simply lack imagination."

"Why, how is that?"

"Well, come with me on a journey; let us go through almost any state, take Tennessee, for example. If you will go with me through middle Tennessee, you will see there a land of splendid farms, rich and fertile. You will find beautiful homes, and in the homes educated, cultured, refined people, the very sort you tell me that interest you."

"Yes, I have been told that many fine people live in middle Tennessee, but what is the connection between that fact and a study of soils?"

"Wait a little. Middle Tennessee soils contain a great deal of carbonate of lime and often considerable amounts of phosphorus. They are rich soils because they have in them the buried ingredients that come from prehistoric animal life of ages gone. The soils being rich support good grass, grain, trees, shrubs and owers. The farms are rich and produce good profit. So the farms are able to bear a high taxation for roads and schools. The result is splendid, polished roads, bright polished minds and manners."

"Yes, I would expect that, though I had not before connected the civilization so directly with the state of the soil."

"Let us examine further the results. A soil rich in carbonate of lime and

phosphorus is a soil that easily maintains fertility. That means that year by year this civilization is to be maintained. There is no fear here of soil exhaustion, no fear of a decay of civilization and right living. Always the blue grass will carpet the hillside, the white road leading to the pretty school house, always bright, intelligent children go smiling along that way."

"Yes, I grant you that."

"Well, then, let us take a short journey to the westward. Soon we leave the land of abundant limestone—land of abundant phosphorus and fertility. We come to a poor region and there we find eroded fields because there the blue grass does not grow, but the broom sedge instead. There we find instead of the fine homes of middle Tennessee, small, unpainted farm houses, wretched roads leading past them and trudging along those wretched roads bare-footed children going to shabby school houses where school lasts but four or five months in the year, because the people are so poor that they cannot afford a longer term. Why, did you know that before Christmas half of these schools have finished their terms?"

"Is that true, indeed?"

"Yes, it is true—all true—but it is not all, nor the worst. The soils there, having in them no carbonate of lime in appreciable amounts, tend steadily more and more toward sterility, so that the people tend steadily more and more to poverty, and with poverty to ignorance, and with ignorance come very distressing symptoms, indeed, as you well know."

"Yes, I can see that, but what can be done?"

"What can be done is, first to learn what the soils lack and then set to work to supply that need. Already the University of Tennessee has attacked this problem and their verdict is given. Carbonate of lime is the first and greatest need, then phosphorus, then humus in the soil—vegetable matter.

"Already the work is vigorously under way in Tennessee, and the results are most hopeful. Men are seeing and believing. Thousands of tons of ground limestone are going out to the soil and a brave beginning is made in soil redemption. It means far more, you see, than mere corn and hogs and mules—it means better, happier, sooner taught young men and young women. Carbonate of lime makes grass and clovers—yes, but it makes men and women, too."

"Yes, yes, I see it now. It is simply fearful to think of a land going on and on, deeper and deeper into barrenness and despair. It is frightful to think of neglected children, dull, half criminal, uncouth, through lacking opportunity.

"Yes, yes, I see it is not a problem of corn and hogs, it is a problem of the boy and the girl."

"It is, indeed, and by the way did you know you could almost make a geologic map of Ohio by simply taking account of the place of residence of our students. The counties where most students come from are the counties richest in carbonate of lime—the counties having few and no agricultural students are the counties most lime hungry.

"There, in the counties of poor soils, the condition of men grows steadily worse.

"That is the tendency, but we hope to stem the tide. We hope to start streams of limestone dust toward the poor soils, to sweeten them, cover them with grass and clover, to give hope to the fathers and mothers and smiles of cheer and intelligence to the boys and girls of these lands, as well as of the naturally rich lands."

"I see, I see. Why, a soil problem is a fascinating thing, after all. I will never again call it sordid."

Sugar Beets---Ohio's New Crop

(Continued from Page 12.)

are paid on a sliding scale, based on the sugar content, which gives them from five to six and a half dollars a ton. All the hand labor, which consists of blocking, thinning, hoeing, topping and piling, is done by foreigners, who receive \$18 an acre. The other work of cultivation is about equal to that done on corn. The hauling is a large item. When one acre will produce five or six wagon-loads, it can readily be seen that a field of twenty or thirty acres will keep two teams busy for some time. As may be seen from the figures quoted, the profits are large. According to the latest investigations, the effect on land is similar to that of corn.

Employees of the factory and citizens of the town made a rather thorough canvas of Paulding and adjoining counties to induce farmers to raise beets last season. Results have been so satisfactory that the entire acreage for next season (some twelve thousand acres) was contracted before the close of 1910, and officials of the company refuse to accept additional acreage. The erection of a second factory in what now comprises the Paulding district will be begun next summer. This will likely be followed by others. Indeed, it is predicted that within a few years the present factory will be supplied wholly within Paulding County.

Ten Important Ohio Insects

By C. L. Metcalf

Ohio has not less than 50,000 distinct species of insects and probably many more. They are related to man in such a multitude of ways, by such intricate links, and for the most part so inconspicuously and unobtrusively, that while many people are scarcely aware of their existence they are nevertheless of vital importance to us. It is safe to say that should all the natural restraints which hold insects in check be removed, the end of two years would find no human being alive upon the earth.

It would perhaps be impossible to pick out ten insects from all these and prove that they are more important than many others. But, at any rate, we are sure we can point out ten that are of so much importance that every man, woman and child ought to know them by sight and to know something of their life-history.

There is one kind of insect which we all have known and held as our special enemy since childhood's earliest summer day. I refer to the bumble-bee. There are several distinct species which pass under this common name, the most of them belonging to the genus *Bombus*.

Many a good straw hat has come to grief in our attempts as boys to end the existence of a happy colony of these bees. But in spite of this common attitude bumble-bees claim our attention as among the most valuable of Ohio insects. It is well-known, even though considerably doubted by many people, that without the work of these insects as pollinizers the crop of seed from red clover must be a failure. The pollen is carried about on the body of the bee as it

visits flower after flower in search of nectar.

All farmers know how valuable the clover crop is. In many places the seed is raised for sale. Practically all, I believe, avail themselves of its rejuvenating, nitrogenous-storing effect on the soil. All of our common red clover, whether for pasture, for seed, or as a fertilizer for the land, besides very much of our fruit, we owe to the humble service of the bumble-bees.

Only the queens or fertilized females survive the winter. In spring they start a nest, lay a few eggs and care for the larvae until they reach maturity. These are workers which take up the work of the colony and leave the queens only the responsibility of egg-laying. Other workers or sterile females are produced until about August, when true females and true males or drones hatch out. These mate; the females live over winter to start colonies in the spring; the drones and workers all die in the fall.

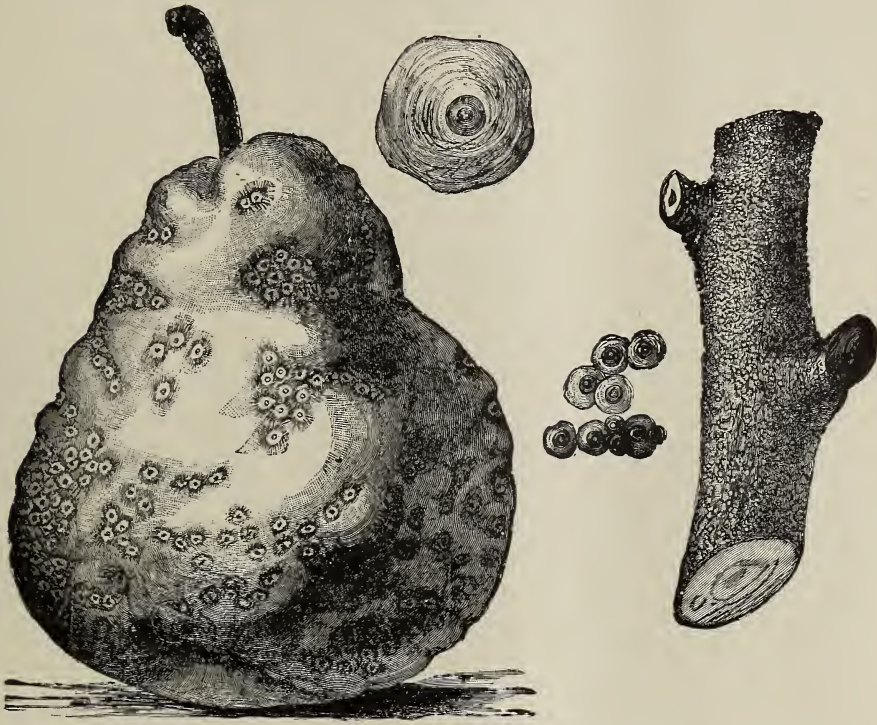
Another insect which we learned to know early and never have been able to forget is that loathesome pest, the mosquito. She is an unmitigated villain, with no redeeming qualities. I say "she" because only the females suck blood, or bite, the males feeding on flowers. Not only does this insect never fail to make life miserable for all who come within the sound of her voice, but she takes on a more serious aspect from her well-known function as sole transmitter of the germs of malarial fever or ague from man to man. For this latter evil a few species of *Ano-*

* A paper read before the National History Society of the University.

phales alone are responsible, the common culex not acting in this way. The genera are easily distinguished among other things by their position when biting. Anopholes holds its body and beak in the same straight line, while in Culex the beak is held more or less nearly at right angles to the axis of the body. These insects have also been suspected of carrying other diseases.

causing at times thousands of dollars' worth of damage to the Ohio wheat crop is the Hessian Fly. It gets its name from the supposition that it was brought to this country by Hessian soldiers in their straw-ticks during the Revolutionary War.

Often when warm weather continues long after the wheat crop has been sown, the field is seen to turn yellow



San Jose scale: On a pear and on a twig, natural size, a group of young scales enlarged, also the adult female enlarged.

It is said that in some parts of the country dairying cannot be carried on profitably because of the annoyance to the herds caused by mosquitoes.

The easiest and one of the most effectual ways of getting rid of them is to dry up all the swamps and stagnant pools where they breed.

An insect which is little known and seldom seen except by entomologists and yet which has caused and is still

and the young plants to shrivel up somewhat. The cause of the trouble is a small brownish fly, a quarter of an inch in length, which lays its eggs on the plants. The larvae, when they hatch, bore their way into the stalk and cause serious damage to the growth of the plant.

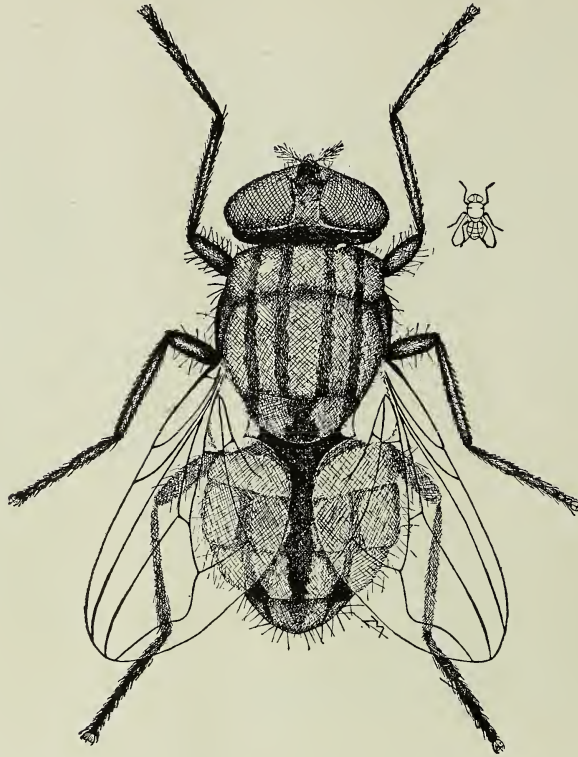
Winter is passed in the hardened larval skin. In spring the pupa stage is quickly passed, adults appear and eggs

are again laid on the plants. These larvae enter the stalks just above the ground, so that they remain in the stubble when the wheat is cut. From here they emerge late in fall and again infest the new crop.

The spread of these flies has been found to be much influenced by the direction of the winds. The only reme-

plum, and to rose bushes and many other ornamental plants.

The insect itself lives beneath a hard scale which it secretes, with its beak inserted in the bark, sucking the juices of the plant. In this species the scale is round or nearly so, ashy-gray in color, about one-twelfth of an inch across, and with a nipple-like prominence in



Common house fly (*Musca domestica*), adult, natural size and enlarged (after Z. P. Metcalf, N. C. Dept. of Agr.)

dies available are late sowing in the fall—as late as is safe—and the burning or plowing under of stubbles after the crop is harvested.

Another insect whose habits are rather obscure and apt not to be fully understood by the average person is the well-known San Jose scale. This insect does very great damage to all kinds of fruit-trees, especially peach, apple and

the center. The adult females have neither legs nor wings, and never move. The males emerge from their scale and fly about to the females. Living young are brought forth, no eggs being laid.

An effective spray can be made at home for these insects. Water-slake 15 pounds of lump lime, add to this 15 pounds of wet sulphur and about 10 gallons of water. Boil for one hour.

Add water up to 50 gallons and spray the affected parts thoroughly in late fall or early spring.

If the luberly Bumble Bees are friends in disguise. "*Musca domestica*," the common House Fly is truly a wolf in

from about dwellings will do more than anything else to stamp out this pest.

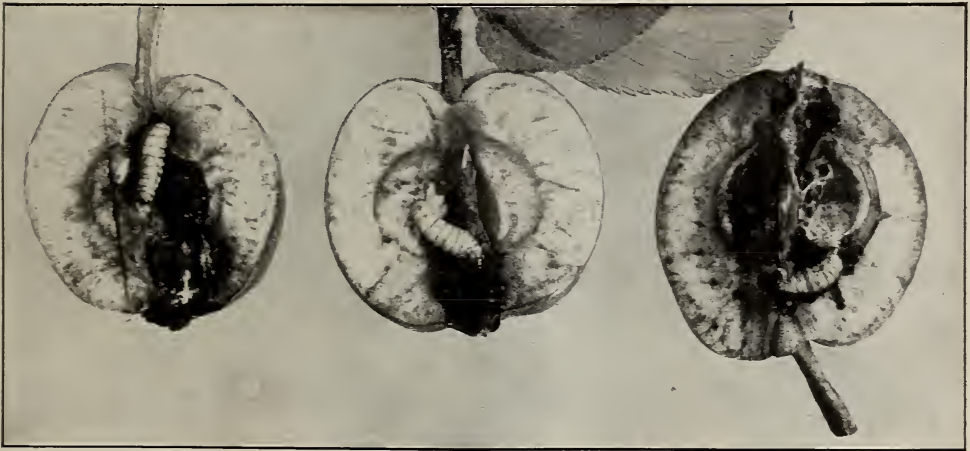
The Codling Moth may not be familiar to all by that name, but I am sure all have made the acquaintance of wormy apples. If so, it is very likely



House fly larva, natural size and enlarged (after Z. P. Metcalf, N. C. Dept. of Agr.)

sheep's clothing. It seems such a harmless insect we seldom condemn it. And yet if the people of Ohio realized the true nature of this insect, they would shun it as a more deadly enemy than the Copper-head or Rattlesnake. Certainly for every death in the State caus-

that the white worm which caused the trouble was the larva of this moth. It was deposited as an egg on the surface of the apple by a pretty little brownish gray moth with golden bands on its wings. The first set of eggs is laid late in spring, the second in midsummer on



Codling moth larvae in apples (after Woglum, N. C. Dept. of Agr.)

ed by venomous snakes, a thousand can be directly traced to the presence of the House Fly in our homes. The disease germs which this fly carries are among others those of typhoid fever, tuberculosis, anthrax, opthalmia, many intestinal disorders, cholera, bubonic plague. The larvae, or young, of the House Fly live chiefly in horse manure and the prompt removal of this

the leaves or fruit. When the eggs hatch, the larvae bore into the apple, the first brood at the flower end, eat more or less around the core and, after a long period of feasting, bore their way out again by a larger hole, crawl to the trunk of the tree and there change to the winged moth or pass the winter in the pupa stage.

Up until about 1859 there lived very

quietly and unobtrusively in some of the western states a species of beetle which has since become well known as the Colorado Potato Beetle. About this time it began to spread rapidly eastward, reaching Ohio about 1877. It has since spread all over the East to every

of all sizes up to a half inch. Winter is passed as pupa or adult underground.

Within the last few years there has appeared in the northern part of the State, at least, large numbers of a long-legged, yellowish-brown beetle known as the "rose-bug" (*Macrodaetylus sus-*



Tomato or tobacco worm, egg enlarged, larva, pupa and adult about natural size (after Z. P. Metcalf, N. C. Dept. of Agr.)

state and almost to every potato-patch. It is a serious enemy of the potato, demanding frequent spraying if the crop is to be saved at all. The adults are yellowish, with ten long black stripes down the back. The larvae, which do most damage, but not all, are short, thick, reddish, hump-backed creatures

spinosus). For a long time past the insect had confined itself to rose-bushes chiefly, but lately it has spread to grapes, cherry-trees and apple-trees, at times ruining the entire crop in places. The only effective means of fighting them seems to be to shake them off into large funnels and kill in kerosene. Their

immense numbers and the difficulty of combating them give them the appearance of a very serious pest indeed. The larvae feed on the roots of grasses.

Tomato-worms are familiar objects to most people, but not all seem to know that these harmless but frightful-look-

We have left to speak of but one, an insect so well known that a word will suffice. The Honey Bee has been known to man from the earliest historic times. Their sweet stores man has appropriated in return for the care he has lavished upon them. The product of this insect



Coddling moth adults (after Slingerland).

ing creatures are the young of a large, narrow-winged, greyish moth. These larvae feed extensively on tomatoes and tobacco-plants, eating the leaves, and do great damage in the State. The pupae of these moths are the common "jug handles" often ploughed out of the ground.

forms an important article of commerce in the state and anyone who enjoys good honey will readily concede *Apis mellifera* to be one of Ohio's ten most important insects.

To my brother, Z. P. Metcalf, of Raleigh, N. C., I am indebted for kindly furnishing cuts of the accompanying illustrations.



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E. R. Hurst, '11 Business Manager
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C. S. Wheeler, '12. . Corresponding Secretary

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Editorial

We hear so much about the great opportunities offered in the fruit sections of the West and the possibilities of the unbroken lands. Such is the story of the alluring advertisements. Too often we become dissatisfied with our present location. Stop a moment and look at what we have at home. What place does our state hold in agriculture? Of the ten leading states in the production of our most important agricultural products, Ohio is the only one found in each list. In yield of corn, for example, she

heads the list of the leading corn states. In live stock Ohio ranks very favorably in numbers when compared with the other states, but in nearly every case she ranks higher in value than in numbers, showing the superior quality of the animals. Quality, a sign of good, careful management and breeding, is what counts. Along horticultural lines Ohio holds only a medium place, but the time is not far distant when she will be one of the states in the production of horticultural products. The remarkable results in the production of apples during the last five years will surely substantiate this fact. A new crop, the sugar beet, has recently come into prominence in the northwestern part of the state and promises to be of great value. In the promotion of agricultural education Ohio surely deserves a high place and has the honor of having the first college in America to give real attention to agriculture. Her prestige is not due to superiority in just one or two lines, but to such a high standing in so many ways. Along many lines other than agricultural Ohio is widely known and every one within her borders should be proud to think they are so fortunately located.

The "Student" wishes to extend a hearty greeting to the Short Course students and desires to help them in every possible way. It is certainly gratifying to see such a large number of the farmers of our state taking advantage of this opportunity to obtain ideas and gain knowledge along agricultural lines.

With this issue we are adding a few more pages to our paper, containing state news of general interest. It is our aim to gradually enlarge this field and make it an important feature of the magazine.



NEWS NOTES



The program for the fourth annual National Corn Exposition, to be held January 30th to February 11th, in the eight immense buildings on the Ohio State Exposition grounds, has been completed, and provides for one of the greatest National Agricultural Expositions ever held in the world.

The buildings are connected by enclosed walks, comfortably heated and brilliantly illuminated, in all resembling a great summer garden with palms and plants and tender growing crops, giving the visitors a whiff of nature which will more remind them of a balmy June day than of the winter season.

This great National Corn Exposition will be a grand round-up of all state agricultural shows and agricultural meetings. The name "Corn Exposition" does not mean that only corn will be shown, for all grains and grasses, the prize-winners only, at the various state shows, will be in competition for the valuable National trophies.

More than 35 states will have competitive exhibits. Twenty-five state agricultural colleges and experiment stations will have scientific exhibits, each demonstrating its most advanced experimental work. These exhibits, which will be in charge of expert demonstrators, will deal, in a practical way, with nearly every phase of the science of agriculture. For instance: North Carolina will emphasize the cotton industry—from the growing plant to the manufactured article—with cotton gin and loom in actual operation, while Illinois will especially emphasize its soil work. Never before in the history of the world has there been such a showing of

results in agriculture, based on scientific investigation.

The federal department of agriculture will be represented with its famous exhibit which fills two large furniture cars, and which has just been returned from the international exposition at Buenos Ayres.

Important among the many meetings, exhibits and other special features of this greatest of agricultural expositions may be mentioned the meetings of the American Breeders' Association; the Ohio Dairymen's Association; the National Rural Life Conference; the Ohio Conservation Association; the Ohio Corn Improvement Association and numerous live stock associations. There will be special features of vital interest to the Y. M. C. A., churches, colleges, schools, the farmer, and the city man and their families alike.

Special entertainment features will include a two-ring winter circus, band concerts with vocal soloists, and moving pictures.

Speakers of nation-wide reputation will deliver addresses daily on the National Corn Exposition program.

POULTRY SHOW.

More than 1500 specimens are assured for the exhibit of the Ohio State Poultry Association, Jan. 17-21. About 68 classes will be represented. In addition there are to be turkeys, peafowls, ducks, geese, game chickens and bantams. Among the large exhibitors are the Hartman Farm, O. E. Miles, M. A. Joyce, Ira Kelley and W. Kelsey Schoepf. The show will be held in the large store rooms, 236, 238, 240 North High street.

AMERICAN BERKSHIRE CONGRESS

Program of the Fifth Annual Meeting of the American Berkshire Congress, Feb. 7th, 2 P. M.: Address of Welcome, Pres. W. O. Thompson; Greeting of Ohio Berkshire Association, Prof. C. S. Plumb; President's Annual Address, T. H. McDonald; Report of Officers; Appointment of Committees; 6 P. M., Annual Banquet; 7:30 P. M., The Pure Bred Hog, a Factor in Our Rural Economy, Prof. J. J. Ferguson; The Berkshire Hog—English and American, Prof. C. S. Plumb. Wednesday, Feb. 8th—9A. M., The Berkshires of the East, J. E. Dodge, of Pennsylvania; The Relationship of the Large Breeder to the Beginner, W. S. Corsa, of Illinois; 1:30 P. M., Sale of 50 head of bred sows, Judging Pavilion.

The last number of the "Ohio Forester," which is published by the State Forestry Society, contains a valuable article on the "Development of Forestry in Ohio." This article is written by Mr. J. W. O'Byrne, of Miami University. It treats of the early forest conditions in Ohio, the work of individuals and organizations to promote the interests of forestry, with an interesting discussion of present conditions and plans for the future. There is appended to the article a fairly complete bibliography of what has been published along forestry lines in Ohio. This should be useful for forestry students.

Mr. C. E. Freeman, an expert cheese maker of Hiram, Ohio, has been engaged to give instructions in cheese making to the short course students. Mr. Freeman has had wide experience and first introduced Camembert cheese into Ohio. Mr. G. J. Underhill has also been appointed assistant in butter making.

HORTICULTURAL SPECIAL.

During the week of Jan. 17 a train especially equipped by the Extension Department for lectures and exhibition purposes will visit towns in southwestern Ohio. About seven stops will be made each day, varying from thirty minutes to two hours each. Lectures, a small fruit exhibit, and illustrative material will be the means of hasty instruction to the farmers. The lectures on Horticulture will be given by Profs. V. H. Davis and J. H. Gourley. C. R. Titlow will also lecture on poultry raising.

J. C. Britton, '98, who has been a government soil expert, connected with the U. S. Department of Agriculture for the past ten years, has resigned his position and is now in the employ of the Southern Nut and Fruit Co. He is located at Albany, Ga., where the company has 2000 acres that they are planting to pecans. Mr. Britton has sent Prof. Lazenby specimens of fourteen varieties of this nut.

The annual meeting of the Ohio State Horticultural Society will be held in Columbus, Jan. 11-13. The second Ohio Apple Show will be held at the same time. The program of the meeting is one of the best that the Society has ever prepared, and no student of horticulture can afford to miss either the meeting or the apple show.

E. R. Linn, '10, who has been engaged as civil engineer on a railway in New Hampshire, has accepted a position in the Forestry service of that state.

The Agronomy Class in Seeds and Market Grains have been judging corn at several shows which have been held in neighboring counties.

The last regular monthly meeting of the Forestry Society was held Jan. 9. One feature of the meeting was "Observations" by different members, and a review of current forest literature. The members of this Society are looking forward to the annual meeting of the State Forestry Society and the State Conservation Congress, which take place during the first week in February.

At the annual meeting of the Columbus Horticultural Society, held December 31, Prof. Lazenby was re-elected President, and Director Smith, of the Weather Bureau, was elected Chairman of the Executive Committee.

At the regular monthly meeting of the Agricultural Society, Mr. E. R. Root, of Medina, O., gave a most interesting and instructive illustrative lecture on Bees. At the close of the lecture Mr. Root gave some demonstrations in live bee handling.

Four o'clock lectures are being held for the benefit of the Short Course students. The speakers to date have been Mr. E. R. Root, of Medina, on "Bee Culture," and Mr. B. E. Carmichael on "Feeding."

The winter course in Agriculture started on Monday, Jan. 2. The enrollment is about 155, which is somewhat larger than last year. There are twelve students enrolled in the special course in dairying, and about forty in the course in Horticulture.

Prof. Chas. S. Plumb spent several days in New York last week, visiting some of the best Holstein-Friesian herds in the country. His ultimate object was the purchase of a high class bull for the University herd.

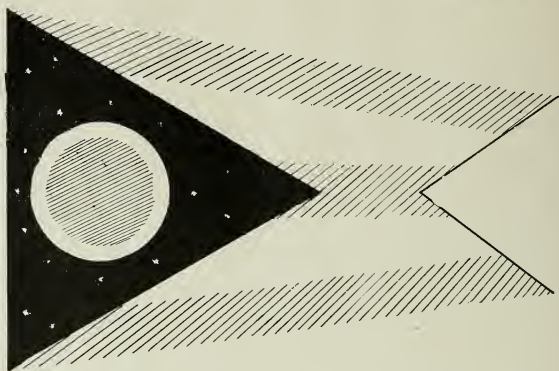
A special Brown Duval moisture tester has been loaned for demonstration work at the Corn Show. The tester is largely of glass and so constructed that all the manipulations can be observed.

At the annual Farmers' Week at State College, Pa., Prof. Plumb was one of the leading authorities and gave several important lectures on Animal Husbandry matters.

David M. Fyffe was again in the limelight with a lengthy and highly entertaining article in the Breeders' Gazette on "Past and Present Champions."



STATE NEWS



The official flag of Ohio, adopted May 9th, 1902. The stripes are red and white. Seventeen stars are on a blue field, surrounding a white "O" with a red center.

Clinton County is seeing some good results from the work done in its Extension Schools. This fall the school was held early in October, which date is a little early, as the men who need these instructions most, are very busy at that time sowing wheat. The Domestic Science department was well attended by women eager to learn some of the scientific principles of preparing foods. They think this a very important part of the extension work.

Many of the farmers of Clinton Co. are planning to attend the National Corn Show.

Clark County was well represented in the recent International, Mr. Jewett, of South Vienna, and Wm. Robbing, of Springfield, being prominent among the exhibitors.

The cow, "Eva De Kol Hengerveld," owned by George J. Hall, of North Olmsted, Cuyahoga Co., has just completed a seven-day test in which she produced 19.4 pounds of butter, 80 per cent. fat. Several herds of pure bred Holsteins have recently been started in this community, resulting in an awakening interest in dairying. Most of the

stock has been purchased in New York and is of very good quality.

Two Institutes were held in December. At South Vienna (Clark Co.), the 26th and 27th; State Speaker C. P. Wagner and Local Speaker J. S. Swaidner, of Springfield, were the leading speakers. There was a good attendance of interested Farmers. The other Institute was held at Fremont, the 30th and 31st. New Carlisle is to have an Institute January 13th and 14th.

One and one-half acres of apples, owned by James G. Donaldson, of North Olmstead, produced 500 bushels of very superior quality. They brought in a net profit of nearly \$400. There were 65 trees in all, mostly Baldwins and Ben Davis. The trees were not fertilized or sprayed, nor did they receive any particular care. The orchard had been used as a pig pasture for a number of year. This instance is not given as an argument against the applying of scientific practices in caring for an orchard, but to show what is sometimes secured in spite of a lack of care.

A Farmers' Institute was held at Scioto (Scioto Co.), Jan. 11-12.

During the past month, Beechland Stock Farm, owned by Clark Bros., Harrison County, shipped as breeding stock over 600 turkeys. They went to 38 states, Mexico and Panama. Turkey breeding is a new line for Beechland Farm, but they already have a reputation for Angus Cattle and Berkshire Hogs which was helped not a little at this year's fairs.

Putnam County raised several hundred acres of sugar beets this past season and shipped to the Paulding factory.

Agriculture is taught in the public schools in Milan, Erie Co.

Mr. Hoover, who lives north of Milan and manufactures potato diggers, is trying out a potato picker.

The Clermont County School was held Nov. 7 to 11.

A long distance corn contest was held last season in Mercer county. Ear-to-row tests were planted in the spring. At the county fair held in Celina an opportunity was given to examine the remnants of the ears and guess on which would be the heaviest yielders. The local corn show was held this month.

The fruit industry is developing very rapidly in Lawrence County. Owing to a very unfavorable season this past year there was only about 50 per cent. of a crop in the county as a whole, yet over 100,000 barrels were produced and at least 75,000 barrels of these were Rome Beauties. There was a Farmers' Institute held at Labelle, Dec. 12th and 13th. The speakers were D. D. Harsh and G. C. Housekeeper. It was rather poorly attended, yet it was a very good Institute. The topics mostly discussed were Fruit Growing, Taxation and the Centralization of Schools. Several of the fruit growers of this county made an exhibit of fruit at the Ohio Apple

Show, held at Columbus, Jan. 9th to 14th.

"Crown," the champion carcass steer at the late International, was sired by "Adamant of Meadowbrook," one of the Angus herd bulls used in the herd of high grade Angus owned by Beechland Stock Farm, Harrison Co.

O. P. Kinney, Vice President of the Valparaiso University, owns the largest apple orchard in Harrison County. He harvested 4,600 bushels from 600 bearing trees—all fine, large, sound apples. Orchardling is in its infancy in this county, but it pays.

In Holmes County a system of live stock farming, begun before the soil was exhausted, has kept the land from deteriorating very much. Interest in progressive agriculture is only beginning, but it is hoped that co-operation among individuals, and an Extension School, will be secured in the near future.

The lady assistant steward of the State Grange is a member of Nebraska Grange at Ashville, Pickaway County.

One of the two new Normal Schools to be established in Northern Ohio will be located at Bowling Green, the county seat of Wood County. Townspeople and farmers worked together to land this prize.

In Butler County cholera epidemics decreased only with the arrival of colder weather. Floats are to be tried by several as a solution to excessive prices charged by fertilizer companies. A corn show was held at Okena, Jan. 5-6.

Van Wert County was recently visited by a car from Western States. Though the exhibits were attractive, the correspondent from that place believes that they could fit out an even better "Ohio car."

The Ross County Corn Show, held under the auspices of the Ross County

Corn Improvement Association, at Chillicothe, O., closed a most successful exhibition on Saturday, Dec. 17. There was a large list of entries, which were well taken care of in the Eagles large and commodious hall. The judging was done by Mr. Edward McCune, of Wilmington, Ohio, assisted by Mr. Q. S. Cook, Jr., of Chillicothe, who spent the entire day Thursday in placing the awards. Mr. Herschel Climer, of Gillespieville, was the most successful exhibitor at the show, taking one first prize of \$50 in gold, two second prizes and a few others. Mr. Climer was the most successful exhibitor two years ago, thus demonstrating his ability to raise prize-winning corn. The prizes were liberal, amounting in all to \$400.00. Judge McCune said it was as fine an exhibition as he had seen at any time. In connection with the show was held a Corn Institute, which was addressed by the Hon. Renick Dunlap, State Dairy and Food Commissioner; John M. Jamison, of Roxabel; Herschel Climer, of Gillespieville; F. C. Kerr, of Lyndon, and Q. S. Cook, Jr., of Chillicothe. Mr. Dunlap handled the subject of disposing of the corn crop in a very able manner. Mr. Jamison spoke upon "Legumes and Rye as a Fertilizer for the Corn Crop." Mr. Climer's address was on the topic, "The Types and Varieties of Corn for Ross Co." Mr. Kerr told his audience how he prepared the seed bed for his corn crop. Mr. Cook spoke of his experiments in this county for the State Experiment Station with a view of determining the thickness of planting.

The Twenty-second Farmers' Institute was held at Richmond on Dec. 12-13, 1910. John Bogg Columbus, of Grove, and S. W. Moore, of Elwell, W. Va., were present. There was a large attendance, good interest and a very profitable Institute. Grange work is

on the jump in this county, two new ones and one old one organized within the past six months, with more than one hundred and fifty members. A Corn show was held at the same time of the Institute, in which much interest was taken. A fine Percheron stallion was brought into Jefferson Co. lately.

The Lancaster Poultry and Pet Stock Association held a very successful exhibition of fine poultry during the week of December 12th. This is the annual show of the Association and breeders of pure bred poultry from many parts of the state were present.

The Fairfield County Corn Improvement Association held its third annual Corn exhibition on Dec. 29, 30 and 31, at Lancaster. Corn talks and addresses were a feature of the show. A large exhibit was made, for corn is King in Fairfield.

The thirty-eighth annual session of the State Grange met at Zanesville, December 13-16. Nearly 1000 people were in attendance. Eighty counties out of the 88 were represented by delegates.

A Farmers' Institute was held at Norwich, Muskingum Co., Dec. 19-20. Large audiences were present at every session.

Potatoes in Stark Co. are very good for those farmers who sprayed and watched the bugs, but neglectful farmers dug only a partial crop and one did not dig a portion of his field at all. Apples were a fair crop and in Canton average now 80c per half bushel, or \$4.80 per barrel. Farmers generally have only a few on hand.

The first Agricultural Extension School of Morrow Co. was held at Mt. Gilead, the county seat, from the 4th to the 9th of December. Eighty-two men were enrolled in the Agricultural course and sixty-five ladies in the Home-Makers' course. As the school

advanced the number of ladies attending greatly increased. After making the start, men were always to be seen present on the following days. The instructors in the Agricultural Department were Stiner, Evans and Waide, of O. S. U., and Welton, of the Ohio Experiment Station. Mrs. C. W. Folk was instructor in the Home-Makers' course, with Miss Billman as assistant. Should the school be held next year, a much larger attendance is certain.

Lake County had its first Agricultural Extension School Dec. 12-17. The largest day's attendance was over 130. W. H. Darst and O. M. Johnson were among the instructors. Much enthusiasm seems to have been created. Farmers who attended thought it was a great thing and felt well repaid for their time. On the last afternoon the school visited the Holden Farm, in Mentor, to see some of their excellent dairy stock. Awards for the Boys' Corn Growing Contest were also made during this school week.

Medina County held its second Poultry and Pet Stock Show on Dec. 7, 8 and 9, in Medina. It proved to be a big event and brought together over 600 fowls, besides other birds and pet stock, the total number of entries being about 200 more than last year. The judging was done by Mr. J. E. Gault, of Chippewa Lake, in a very able and satisfactory manner. The Rhode Island Reds were in greatest numbers, with 85 entries, and the following breeds had entries in the order named: White Leghorns, Buff Rocks, White Wyandottes, Minorcas and White Rocks. Many other breeds were represented, besides ducks, doves, hares and guinea pigs. It was a very successful show.

Geauga County's second Extension School, held at Burton, Dec. 5-9, was very successful in all respects. The at-

tendance was about 100 in each department. Enthusiasm among the students was very high. The ladies report the work in the Home-Makers' department, Miss Jefferson and Miss Van Sickle instructors, as very instructive and beneficial. Prof. Neale found the men responsive to all phases of the dairy problem. The work with corn in the Farm Crops division was of especial interest, and Prof. Darst presented the work very well. Perhaps the most appreciation and satisfaction was expressed about Prof. Johnson and his work in Soil Fertility. The subject appealed to each student and brought out many questions. Prof. Johnson was primed to the brim and met all queries with a comprehensive reply. There was not a moment lost while he had the floor. Several adjoining towns are working for the next school. The Western Reserve Holstein-Friesian Breeders' Association at its last meeting took steps to co-operate with the legislators from its district upon all proposed dairy and agricultural legislation. This association is a most live organization and leading in all advance steps.

Much interest is manifested over the efforts of two horticulturalists in the southern part of Geauga County. They are trying to control the codling moth and other orchard pests by banding their apple trees. While surrounding orchards are brown in the spring and appleless in the fall, these men have good crops.

In Stark County Registered Jerseys are the favorite dairy stock.

December 23-24 were the dates of the Corn Show and Institute at West Jefferson (Madison Co.). Madison County farmers favor having quail protected by the same laws as song birds.

In Guernsey County Mr. L. H. Wilson raised 83 bushels 31 pounds of corn

on an acre. This is considered a good yield for this year in that vicinity. A sample of the corn will be exhibited at the State Corn Show in Columbus.

Several thousand western bred, Chicago marketed sheep are being fed in Madison County this winter.

The feeding of grade Shorthorns is a feature in Pickaway County. Mr. Reber has a herd of about ninety head. A chicken show was held in connection with the Institute at Ashville this month. This show is part of a campaign to improve the quality of poultry kept.

County Correspondents whose news is printed in this issue, with the name of the counties which they represent:

F. B. Winter—Scioto.

G. C. Portz—Tuscarawas.

L. M. Fox —Geauga.

A. G. Abbot—Medina.
 Chas. M. Richardson—Lake.
 G. C. Long—Morrow.
 H. B. Bates—Stark.
 Corwin Blue—Madison.
 F. L. White—Muskingum.
 C. W. Hengst—Fairfield.
 Albert Mayfirth—Holmes.
 C. W. McCullough—Jefferson.
 J. E. Stewart—Guernsey.
 H. L. Reber—Pickaway.
 Jas. McCallister—Ross.
 C. J. Bair—Wood.
 E. A. Risser—Putnam.
 H. J. Brown—Erie.
 E. H. Mickle—Clark.
 T. J. Lane—Clinton.
 T. A. Dubrul—Clermont.
 A. E. Shanklin—Mercer.
 D. H. Clippinger—Van Wert.
 Walter Holson—Ashtabula.

The Possibilities of Agriculture in Ohio

(Continued from Page 9.)

kept sufficient live stock to produce about a ton and a half of manure for each acre, while the Station has expended on each acre in the cereals for lime and fertilizers about \$4.50 and has used nearly four tons of manure for each acre. Allowing 50 cents per ton for the labor of handling the manure, the net proceeds of an average acre for the county has amounted to \$14.35, and that for the Station to \$24.50, a difference of \$10 per acre in favor of the Station's crops, or enough to pay the entire labor cost of producing the crops.

The Ohio Station's experiments are not limited to those conducted in Wayne county, but are being duplicated in several other sections of the state, on soils widely different in character, and they all teach the same lesson, namely: that it is abundantly possible

to very greatly increase the average production of Ohio's soils, and to accomplish this by methods under which each upward step in production will be more than compensated by the greater value of the resultant produce.

The successful employment of these methods, however, involves a more thorough training in the scientific principles upon which the maintenance of soil fertility depends than that obtained in the ordinary high school and denominational college. Very few of the present generation of Ohio farmers have had such training. The majority are therefore working largely in the dark. The methods which their fathers followed so successfully on virgin soils are no longer sufficient for the worn fields which they have inherited, but they are not able to adjust their prac-

tice to the new conditions, and the consequence is that the average Ohio farm is producing not more than half the produce of which it is capable, and farms everywhere are for sale at prices based upon their low production.

To the man, therefore, who is able to make use of the methods in agriculture which have been worked out by scientific investigation, there is no more promising field for investment than is offered by the farm lands of Ohio, and to the young man who has had the good fortune to grow up on a farm and thus absorb that practical knowledge of and experience in the work of the farm which can only be obtained on the farm

itself, and then has been able to supplement that practical experience with the scientific training offered by the College of Agriculture, the redemption of a rundown farm offers an enticing opportunity.

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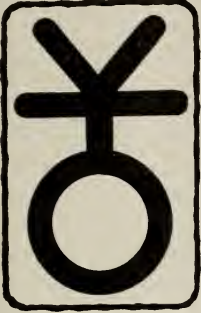
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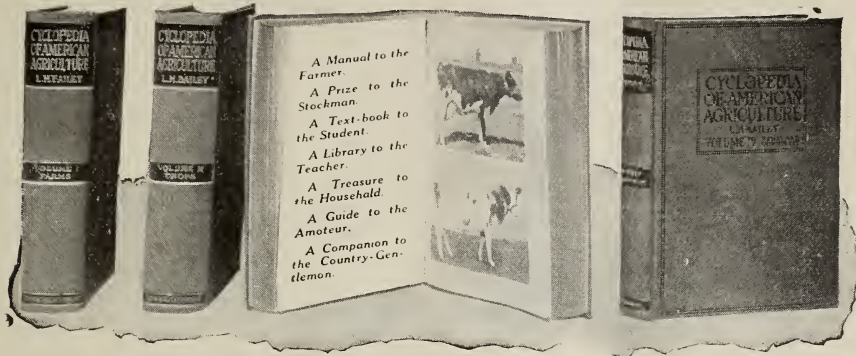
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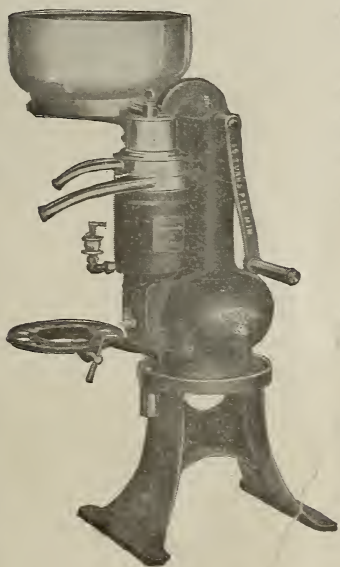
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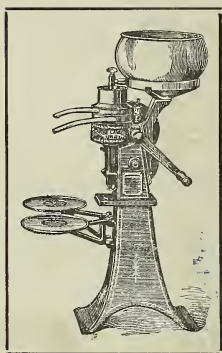
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